

PREHOSPITAL TRAUMA GUIDELINES



Prepared by:

Section of Community Health and EMS
Division of Public Health
Department of Health and Social Services
Box 110616
Juneau, AK 99811-0616
(907) 465-3027
(907) 465-4101 (fax)
<http://www.chems.alaska.gov>

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INTRODUCTION

These Trauma Guidelines were written in an effort to promote more efficient care and transportation of the severely injured trauma patient.

They were designed to be used in the initial, and continuing, training of EMT-Is, EMT-IIs, EMT-IIIs, and Mobile Intensive Care Paramedics. The EMT-I, EMT-II, and EMT-III examinations for certification include questions which are based on these guidelines.

These guidelines are meant to serve as a framework and provide a general approach to the trauma patient. To maximize the benefit of these guidelines on patient care, prehospital emergency care providers should discuss them with their physician medical directors so that, in addition to the recognition and management of the particular type of traumatic injury, each person involved in the prehospital care of the trauma patient knows:

1. who is in charge of the trauma patient at the scene;
2. what trauma care procedures are authorized for each level of certification and which are appropriate for his or her particular service;
3. what options exist for the transport of the trauma patient (air, ground, water);
 - a. how the special transport services, such as an air ambulance, are activated.
 - b. at what point in the care of the trauma patient this activation takes place.
4. the emergency medical service's policies and procedures for communicating with emergency department personnel/physicians during the care of the trauma patient; and
5. the emergency medical service's policies and procedures for adequately documenting trauma care.

The Medical Director of the EMS system should develop local protocols to identify significant trauma in the field which is likely to require surgical intervention.

The physician approved field triage protocols should trigger a well defined and practice transport process to an appropriate medical facility without delay.

These guidelines are consistent with the material presented in national trauma training programs, such as the Basic Trauma Life Support and Prehospital Trauma Life Support Programs. Readers are encouraged to attend either of these programs and to practice their trauma care skills frequently.

Readers are encouraged to read the *Alaska Prehospital Transport and Transfer Guidelines*.

Notes regarding PASG use: Issues regarding the use of the pneumatic anti shock garment in rural trauma and the optimum blood pressure which should be maintained during resuscitation remain unclear. MICPs should be familiar with local and state protocols for PASG use.

Notes regarding assessment related terminology: These guidelines use terms related to patient assessment which are consistent with the National Standard Curriculum, EMT-Basic, Revised 1994. Unless the context indicates otherwise, an "initial assessment" is equivalent to a "primary survey" and a "detailed" assessment is equivalent to a "secondary survey." Other assessment related terms should be self explanatory.

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TRAUMA

*The priorities in trauma management are to prevent further injury, provide rapid transport, notify the receiving facility, and initiate definitive treatment. **Trauma patients can not be treated completely in the field.** On scene time should be as short as possible unless there are extenuating circumstances, such as extrication, hazardous conditions, or multiple patients. Document these circumstances on the patient record. Determine how the patient should be transported as soon as possible so that activation of a special transport service, such as an air ambulance, if appropriate, can be performed in a timely manner. Notification of the receiving hospital of patient conditions and status should be done as early as possible. This allows the receiving hospital additional time to mobilize any necessary resources.*

The pre-hospital assessment and management of a trauma patient should be performed under the direction of one person. That director should be an individual who has been properly trained in the assessment and management of trauma patients and who has a complete understanding of local and regional triage and transport protocols and capabilities. Although the presence of alcohol or other drugs may mask some of the signs of severe trauma, assume that the patient's condition is caused by trauma until proved otherwise.

Blunt trauma full arrest is universally fatal. If transport to hospital is greater than five minutes, do not attempt resuscitation.

BLS:

1. Ensure scene safety. First priority should be given to the safety of the rescuers and then to altering the scene to make it a safe working environment or, if necessary, to moving the patient from the scene.
2. Perform a scene survey to assess environmental conditions and mechanism of injury.
3. Take body substance isolation precautions.
4. Establish patient responsiveness. Manually stabilize the spine. Protect patient from heat loss.
5. Open the airway using head tilt/chin lift if no spinal trauma is suspected, or modified jaw thrust if spinal trauma is suspected.
6. Establish and maintain a patent airway while protecting the cervical spine. Suction as necessary. Insert an oropharyngeal or nasopharyngeal airway adjunct if the airway cannot be maintained with positioning. (Note that the nasopharyngeal airway is contraindicated in the presence of maxillary facial trauma.)
7. Evaluate breathing – Is the patient breathing spontaneously? Are respirations adequate in rate and depth?

- a. Look for:
 - 1. nasal flaring
 - 2. cyanosis
 - 3. rapid respirations (tachypnea)
 - 4. retractions
 - 5. asymmetry of chest wall
 - 6. open wounds or bruising of chest wall
 - b. Listen for:
 - 1. breathing
 - 2. abnormal breath sounds
 - 3. stridor – indicates partial airway obstruction
 - c. Feel for:
 - 1. rib fractures
 - 2. crepitus
8. Initiate pulse oximetry, if available.
9. If breathing is inadequate, assist ventilation using a bag-valve-mask device with high flow, 100% concentration oxygen. Monitor for abdominal distention.
10. If breathing remains difficult for the patient, and he/she has an obvious chest injury, refer to appropriate protocol for management of chest trauma.
11. If breathing is adequate, administer high flow, 100% concentration oxygen using a non-rebreather mask or blow-by as tolerated.
12. Assess circulation and perfusion:
- a. Check for the presence of a pulse. If the patient has no pulse, begin CPR.
 - b. Check rate and quality of pulse.
 - c. Inspect for obvious bleeding.
 - d. Check blood pressure.
 - e. Observe skin color and temperature, and in children - capillary refill time.
13. Control hemorrhage with direct pressure or a pressure dressing.
14. If the patient is hypotensive, place the patient in a supine position with feet higher than head and consider the use of pneumatic anti shock garment (PASG) if indicated by local protocol.
15. Assess mental status.
16. If spinal trauma is suspected, place a rigid cervical collar and immobilize the patient as appropriate.
17. Expose the patient as necessary to perform further assessments while maintaining the patient's body temperature.

18. Initiate transport to a higher level medical facility. Rescuers should begin transport no more than 10 minutes after their arrival on the scene unless extenuating circumstances exist.
19. Splint obvious fractures of long bones.
20. Perform focused history and detailed physical examination en route to the hospital if patient status and management of resources permit.
21. Reassess patient frequently throughout transport.
22. Contact medical direction for additional instructions.

ALS:

In addition to the above instructions, providers trained beyond BLS may initiate the following treatments.

1. Perform endotracheal intubation if the airway cannot be maintained by positioning or if prolonged assisted ventilation is anticipated. An assistant must maintain in-line cervical stabilization throughout this procedure. Use pharmacological adjuncts, such as lidocaine, sedatives, and paralytic agents, to aid in intubation as permitted by medical direction.
2. If intubation is made difficult by factors, such as clenched teeth, combativeness, etc., perform a rapid sequence intubation, using a paralytic such as vecuronium or succinylcholine, if properly trained and authorized to do so by his or her physician medical director.
3. If a tension pneumothorax is suspected by mechanism of injury and as evidenced by severe respiratory distress, and/or absent breath sounds, perform needle decompression with a large bore needle at the second intercostal space over the third rib at the midclavicular line.
4. Initiate cardiac monitoring. Treat cardiac arrhythmias as dictated by your standing orders.
5. Obtain intravenous access using age-appropriate large bore needle and balanced salt solution, e.g. normal saline or lactated ringers. If the patient shows signs of shock, initiate intravenous access in two sites using large bore needles. Do not delay transport to obtain intravenous access, this can be done en route.
6. Relative contraindications to morphine use include a patient with hypotension, altered level of consciousness, head injuries, or respiratory distress. Use as dictated by your standing orders otherwise.

Additional Pediatric Considerations:

1. Children experience different types of injuries and have different physiologic reactions to injury as compared to adults. Patient outcome depends on the time it takes to get the patient

to the hospital. Therefore, assessment and treatment are frequently done at the same time and scene time should be minimized to less than 10 minutes, if possible.

2. Continual assessment of children is imperative. A child may look fine one minute, then suddenly decompensate.
3. PASG may be used in children over 40 lbs. if local protocol dictates. Do not inflate the abdominal section in children less than 10 years of age. (Do not rely on blood pressure as a sign of shock in children; it is a very late finding.)
4. If tension pneumothorax is suspected, perform needle decompression with an 18 or 20 gauge over the needle catheter at the second intercostal space over the third rib at the midclavicular line.
5. When obtaining intravenous access, use an age appropriate large-bore catheter with large-caliber tubing and administer normal saline at a sufficient rate to keep the vein open. If the patient shows signs of shock, initiate intravenous access in two sites.
6. If signs of decompensated shock are present, such as: decreased level of consciousness, poor color, capillary refill greater than 2 seconds, decreased blood pressure; administer a normal saline or lactated ringers fluid bolus at 20 cc/kg set to maximum flow rate. Reassess patient. Two additional fluid boluses at 20 cc/kg may be given if the patient remains in decompensated shock.
7. If signs of decompensated shock are present in a child less than 6 years of age and intravenous access cannot be obtained, obtain intraosseous access. Administer a normal saline fluid bolus at 20 cc/kg and reassess the patient. Two additional fluid boluses at 20 cc/kg may be given if the patient remains in decompensated shock..

HEAD AND SPINE TRAUMA

Management of head injuries in the field is directed at preventing “secondary injury.” This is brain injury caused by hypoxia and shock after the initial injury has occurred. Evaluation and support of the patient’s ABC’s should be the first priority. As with all trauma patients, complete therapy for head and spine injuries must take place in the hospital. Delays at any level may be harmful to the patient.

*Patients with head injuries can get worse quickly, even though they appear stable initially. Although the presence of alcohol and other drugs may make evaluation of head injuries difficult, always assume symptoms are the result of the trauma and treat as such. **Routine use of hyperventilation in the patient with head trauma is no longer recommended.***

BLS

1. Ensure scene safety. First priority should be given to the safety of the rescuer and then to altering the scene to make it a safe working environment, or if necessary, to moving the patient from the scene.
2. Perform a scene survey to assess environmental conditions and mechanism of injury.
3. Take body substance isolation precautions.
4. Establish patient responsiveness. Manually stabilize the spine.
5. Open the airway using head tilt/chin lift if no spinal trauma is suspected, or modified jaw thrust if spinal trauma is suspected.
6. Establish and maintain a patent airway while protecting the cervical spine. Suction as necessary. Insert an oropharyngeal airway if the airway cannot be maintained with positioning. Note that the nasopharyngeal airway is contraindicated in the presence of traumatic head injury.
7. Evaluate breathing – Is the patient breathing spontaneously? Are respirations adequate in rate and depth?
8. Initiate pulse oximetry, if available, and monitor to maintain oxygen saturation (SpO₂) greater than 90%. Note that even a single instance of SpO₂ less than 90% can significantly effect patient outcome.
9. If breathing is inadequate, assist ventilation using a bag-valve-mask device with high flow, 100% concentration oxygen. Adult, 10 – 12 breaths/minute; child, under age 8, 12 - 16 breaths/minute; and infants, 16 – 20 breaths/minute. Monitor for abdominal distention.
10. If breathing is adequate, administer high flow, 100% concentration oxygen using a non-rebreather mask or blow-by as tolerated.

11. Assess circulation and perfusion:

- a. Check for the presence of a pulse. If patient has no pulse, begin CPR.
- b. Check rate and quality of pulse.
- c. Inspect for obvious bleeding.
- d. Check blood pressure. (Hypotension in an adult, except as a terminal event, is not caused by isolated head injuries. You should assess the abdomen and femurs for additional injuries.)
- e. Observe skin color and temperature, and in children - capillary refill time.

13. Treat bleeding as indicated with direct pressure or a pressure dressing.

14. Repeatedly assess mental status using the Glasgow Coma Scale (GCS) to track changes in patient's GCS.

GLASGOW COMA SCALE

BEST EYE RESPONSE

Adult & Child	Infant (12 months)	Points
Spontaneous	Spontaneous	4
To Command	To Voice	3
To Pain	To Pain	2
None	None	1
	TOTAL	

BEST VERBAL RESPONSE

Adult & Child	Infant (12 months)	Points
Oriented	Coos and Babbles	5
Confused	Irritable Cry	4
Inappropriate	Cries to Pain	3
Incomprehensible	Moans to Pain	2
None	None	1
	TOTAL	

BEST MOTOR RESPONSE

Adult & Child	Infant (12 months)	Points
Obeys Command	Spontaneous Movements	6
Localizes Pain	Withdraws (Touch)	5
Withdraws	Withdraws (Pain)	4
Flexion to Pain	Flexion to Pain	3
Extension to Pain	Extension to Pain	2
	None	1
	TOTAL	

Total: Best Eye Response	
Total: Best Verbal Response	
Total: Best Pain Response	
Glasgow Coma Score	

15. Evaluate pupil size and reactivity. Be alert for unequal pupil size or reactivity.
16. Expose the patient as necessary to perform further assessments while maintaining body temperature.
17. Evaluate spinal cord integrity in a conscious patient by recording ability to move extremities to command. Perform gross sensory exam with sharp sensation or light touch.
18. Evaluate spinal cord integrity in an unconscious patient by recording presence or absence of extremity movement to painful stimulus.
19. Initiate transport to a higher level medical facility. Rescuers should begin transport no more than 10 minutes after their arrival on the scene unless extenuating circumstances exist.
20. Splint obvious fractures of long bones.
21. Reassess patient frequently throughout transport as a head injured patient may deteriorate rapidly. Changes in the exam can be more important than the initial exam.
22. Record all findings.
23. If head injury is suspected, hyperventilate the patient if the following conditions exist:
 - the GCS score is less than 8;
 - active seizures or one or more of the following signs of brain herniation are present;
 - ◆ Fixed or asymmetric pupils.
 - ◆ Abnormal flexion or abnormal extension (neurologic posturing).
 - ◆ Hypertension and bradycardia in conjunction with altered mental status.
 - ◆ Intermittent apnea
 - ◆ Further decrease in GCS score of 2 or more points.Hyperventilation rate is:
 - ◆ adult patient with high flow oxygen at a rate 16 - 20 breaths/minute;
 - ◆ child under age 8, 20 – 24, breaths/minute; and
 - ◆ infants, 24 –28 breaths/minute.
24. Contact medical direction for additional instructions.

ALS

In addition to the above instructions, providers trained beyond BLS may initiate the following treatments.

1. Perform endotracheal intubation if the airway cannot be maintained by positioning or if prolonged assisted ventilation is anticipated. An assistant must maintain in-line cervical stabilization throughout this procedure. Consider using pharmacological adjuncts, such as lidocaine, sedatives, or short term paralytic agents, to aid in intubation as permitted by medical direction.

2. Initiate cardiac monitoring. Treat cardiac arrhythmias as dictated by your standing orders.
3. Obtain intravenous access using an age-appropriate large bore needle and balanced salt solution, e.g. normal saline or lactated ringers. If the patient shows signs of shock, initiate intravenous access in two sites using large bore needles. Do not delay transport to obtain intravenous access, this can be done en route.
4. Relative contraindications to morphine use include a patient with hypotension, altered level of consciousness, head injuries, or respiratory distress. Use as dictated by your standing orders otherwise.

Additional Pediatric Considerations:

1. Head injuries in children are common. Blunt mechanisms like falls and motor vehicle crashes are the most common causes of head injuries in children.
2. Children are anatomically prone to head injuries because of their large heads, weak neck muscles and immature brain tissue.
3. Aside from the obvious head injury, suspect a head injury in the child who is:
 - inconsolable,
 - irritable,
 - has a high pitched cry,
 - vomits repeatedly,
 - is unusually quiet,
 - has difficulty walking (if ambulatory at the scene prior to EMS arrival),
 - has a bulging fontanelle, and
 - battle signs, or raccoon eyes.
4. When obtaining intravenous access, use an age appropriate large-bore catheter with large-caliber tubing and administer normal saline or lactated ringers at a sufficient rate to keep the vein open. If the patient shows signs of shock, initiate intravenous access in two sites.
5. If signs of decompensated shock are present, such as: decreased level of consciousness, poor color, capillary refill greater than 2 seconds, decreased blood pressure; administer a normal saline or lactated ringers fluid bolus at 20 cc/kg set to maximum flow rate. Reassess patient. Two additional fluid boluses at 20 cc/kg may be given if the patient remains in decompensated shock.
6. If signs of decompensated shock are present in a child less than 6 years of age and intravenous access cannot be obtained, obtain intraosseous access. Administer a normal saline or lactated ringers fluid bolus at 20 cc/kg and reassess the patient. Two additional fluid boluses at 20 cc/kg may be given if the patient remains in decompensated shock.

CHEST TRAUMA

Chest trauma can lead to severe internal injuries which are often difficult to specifically diagnose. A history of chest trauma should lead you to suspect a serious injury and patients should be treated with that expectation.

Three major chest injury syndromes can lead to rapid death. They must be recognized and treated rapidly. They include:

- *Bleeding from rupture of a major chest vessel;*
- *Mechanical decrease of cardiac output (which may be caused by cardiac tamponade or cardiac contusion with or without arrhythmia);*
- *Respiratory distress (which may be caused by tension pneumothorax, flail chest, or an open chest wound).*

If chest injury interferes with breathing, it becomes part of your initial assessment and management of the trauma patient. Otherwise, evaluation of chest trauma is part of the detailed assessment and should be performed only after the ABCs have been evaluated and supported. Objects penetrating the chest wall should be stabilized and not removed.

BLS:

1. Ensure scene safety. First priority should be given to the safety of the rescuers and then to altering the scene to make it a safe working environment or, if necessary, to moving the patient from the scene.
2. Perform scene survey to assess environmental conditions and mechanism of injury.
3. Take body substance isolation precautions.
4. Establish patient responsiveness.
5. Open the airway using head tilt/chin lift if no spinal trauma is suspected, or modified jaw thrust if spinal trauma is suspected.
6. Establish and maintain a patent airway while protecting the cervical spine. Suction as necessary. Insert an oropharyngeal or nasopharyngeal airway adjunct if the airway cannot be maintained with positioning. (Note that the nasopharyngeal airway is contraindicated in the presence of maxillary facial trauma.)
7. Initiate pulse oximetry, if available.
8. Look at the bare chest wall for asymmetry of movement, distended neck veins, open wounds, deviation of the trachea and bruises. Inspect the entire chest wall, front and back, maintaining cervical immobilization and log rolling when indicated.

Respiratory distress, despite an open airway, may suggest a tension pneumothorax, a flail chest, or an open chest wound.

- a. Signs of a tension pneumothorax include the presence of unilateral breath sounds, hypotension, or respiratory distress, distended neck veins, crepitus and tracheal deviation.
 1. If a penetrating chest wound has been sealed, temporarily unseal the wound and allow air to escape.
 2. Transport patient lying on injured side if spinal immobilization permits and it is tolerated by the patient. Otherwise, place the patient in the position of comfort.
 3. Assist ventilation with positive pressure oxygen if available.
 - b. Signs of flail chest may include paradoxical movement of the chest wall.
 1. Assist ventilation with positive pressure oxygen if available.
 - c. Signs of an open chest wound include breaks in the chest wall, associated subcutaneous emphysema, and to and fro movement of air from the chest wound.
 1. Cover with a sterile occlusive dressing taped on three sides.
 2. Observe closely for signs of developing tension pneumothorax.
9. Listen to the chest in all lung fields anterior and posterior for the movement of air.
 10. If breathing is inadequate, assist ventilation using a bag-valve-mask device with high flow, 100% concentration oxygen, at normal rate. Monitor for abdominal distention.
 11. If breathing is adequate, administer high flow, 100% concentration oxygen using a non-rebreather mask or blow-by as tolerated.
 12. Assess circulation and perfusion:
 - a. Check for the presence of a pulse. If patient has no pulse, begin CPR. Blunt trauma with full arrest is fatal. Contact medical control for instructions.
 - b. Check rate and quality of pulse.
 - c. Inspect for obvious bleeding.
 - d. Check blood pressure.
Hypotension (without evidence of external bleeding) suggests disruption of a major vessel, cardiac tamponade or a cardiac contusion.
 1. Signs of disruption of a major vessel include hypotension without evidence of external bleeding, and an appropriate mechanism of injury (e.g. steering wheel injury).
 - a. Place the patient in a supine position with feet higher than head.
 2. Signs of cardiac tamponade include history of blunt or penetrating chest trauma, the presence of distended neck veins and muffled heart sounds.
 - a. Treat as for hypotension.
 3. Signs of cardiac contusion include a history of blunt chest trauma and cardiac arrhythmias.
 - a. Treat as for hypotension.
 - e. Observe skin color and temperature, and in children - capillary refill time.

13. Treat bleeding as indicated with direct pressure or a pressure dressing.
14. Feel the chest for tenderness, rib and clavicle fractures and crepitus.
15. Obtain and record vital signs frequently.
16. Reexamine the chest every 5 – 10 minutes, observing for changes.
17. Record all findings.
18. Expose the patient as necessary to perform further assessments while maintaining the patient's body temperature.
19. Initiate transport to a higher level medical facility. Rescuers should begin transport no more than 10 minutes after their arrival on the scene unless extenuating circumstances exist.
 - a. Procedures, other than airway and immobilization, should be deferred to en route.
20. Continue ongoing evaluation and stabilization of chest injuries en route to a higher level medical facility.
21. Perform focused history and detailed physical examination en route to the hospital if patient status and management of resources permit.
22. Contact medical direction for additional instructions.

ALS:

In addition to the above instructions, providers trained beyond BLS may initiate the following treatments.

1. Perform endotracheal intubation if the airway cannot be maintained by positioning or if prolonged assisted ventilation is anticipated. An assistant must maintain in-line cervical stabilization (if indicated) throughout the procedure. Use pharmacological adjuncts, such as lidocaine, sedatives, and paralytic agents, to aid in intubation as permitted by medical direction.
2. If intubation is made difficult by factors, such as clenched teeth, combativeness, etc., perform a rapid sequence intubation, using a paralytic such as vecuromium or succinylcholine, if properly trained and authorized to do so by his or her physician medical director.
3. If a tension pneumothorax is suspected by mechanism of injury and as evidenced by sharp, severe respiratory distress, and/or absent breath sounds, perform needle decompression with a large bore needle at the second intercostal space over the third rib at the midclavicular line.
 - a. This is an airway procedure and must be performed early, if indicated.
 - b. Perform procedure bilaterally if no success.
4. Initiate cardiac monitoring. Treat cardiac arrhythmias as dictated by your standing orders.

5. Obtain intravenous access using a large bore needle and balanced salt solution, e.g., normal saline or lactated ringers. If the patient shows signs of shock, initiate intravenous access in two sites using large bore needles. Do not delay transport to obtain intravenous access, this can be done en route. Goal is systolic blood pressure above or about 90mmHg.
6. Relative contraindications to morphine include a patient with hypotension, altered level of consciousness, head injuries, or respiratory depression. Use as dictated by your standing orders otherwise.

Additional Pediatric Considerations:

7. Children experience different types of injuries and have different physiologic reactions to injury as compared to adults. Patient outcome depends on the time it takes to get the patient to the hospital. Therefore, assessment and treatment are frequently done at the same time and scene time should be minimized to less than 10 minutes, if possible.
 - a. Pneumothorax is the most common pediatric life-threatening chest injury. This is often worsened by positive pressure ventilation. Be prepared to decompress.
 - b. Flail chest is uncommon in children because of rib flexibility.
8. If tension pneumothorax is suspected, perform needle decompression with an 18 or 20 gauge over the needle catheter at the second intercostal space over the third rib at the midclavicular line. Bilaterally, if no success.
9. When obtaining intravenous access, use an age appropriate large-bore catheter with large-caliber tubing and administer normal saline or lactated ringers at a sufficient rate to keep the vein open. If the patient shows signs of shock, initiate intravenous access in two sites.
10. If signs of decompensated shock are present, such as: decreased level of consciousness, poor color, capillary refill greater than 2 seconds, decreased blood pressure; administer a normal saline or lactated ringers fluid bolus at 20 cc/kg set to maximum flow rate. Reassess patient. Two additional fluid boluses at 20 cc/kg may be given if the patient remains in decompensated shock.
11. If signs of decompensated shock are present in a child less than 6 years of age and intravenous access cannot be obtained, obtain intraosseous access. Administer a normal saline or lactated ringers fluid bolus at 20 cc/kg and reassess the patient. Two additional fluid boluses at 20 cc/kg may be given if the patient remains in decompensated shock.

ABDOMINAL TRAUMA

Pre-hospital care of abdominal injuries should focus on quick treatment of internal bleeding and wound care. Penetrating trauma injures the area of entry and may damage any tissue along the line of penetration. Blunt trauma may be widely transmitted and cause damage to any or all organs within the abdominal cavity. Blunt trauma to the abdomen may also cause injury to organs outside the abdominal cavity. These include internal chest organs. Ongoing reevaluation of the abdomen requires you to recheck the chest also.

As with all trauma patients, complete therapy for abdominal injuries must take place in the hospital. Delays at any level can be harmful to the patient. Evaluation of abdominal trauma is part of the detailed assessment. It should be performed only after the patient's ABCs have been evaluated and supported, and the patient is en route to a higher level medical facility or awaiting transportation to that facility.

Objects penetrating the abdominal wall should be stabilized and not removed. Any organs protruding from abdominal wounds should be covered with moist gauze and not replaced.

BLS:

1. Ensure scene safety. First priority should be given to the safety of the rescuers and then to altering the scene to make it a safe working environment or, if necessary, to moving the patient from the scene.
2. Perform scene survey to assess environmental conditions and mechanism of injury.
3. Take body substance isolation precautions.
4. Establish patient responsiveness.
5. Open the airway using head tilt/chin lift if no spinal trauma is suspected, or modified jaw thrust if spinal trauma is suspected.
6. Establish and maintain a patent airway while protecting the cervical spine. Suction as necessary. Insert an oropharyngeal or nasopharyngeal airway adjunct if the airway cannot be maintained with positioning. (Note that the nasopharyngeal airway is contraindicated in the presence of maxillary facial trauma.)
7. Initiate pulse oximetry, if available.
8. If breathing is inadequate, assist ventilation using a bag-valve-mask device with high flow, 100% concentration oxygen. Monitor for abdominal distention.
9. If breathing is adequate, administer high flow, 100% concentration oxygen using a non-rebreather mask or blow-by as tolerated/needed.
10. Assess circulation and perfusion:

- f. Check for the presence of a pulse. If patient has no pulse, begin CPR.
 - g. Check rate and quality of pulse.
 - h. Inspect for obvious bleeding.
 - i. Check blood pressure.
 - j. Observe skin color and temperature, and in children - capillary refill time.
11. Control hemorrhage with direct pressure or a pressure dressing.
 12. If the patient is hypotensive, place the patient in a supine position with feet higher than head and consider the use of pneumatic anti shock garment (PASG) if indicated by local protocol. Use of PASG in the patient with abdominal trauma is controversial. If indicated by local protocol, inflate and maintain the patient's systolic blood pressure at the level specified in the protocols. Do not inflate the abdominal section if the patient has an evisceration.
 13. Assess mental status.
 14. Look at the bare abdomen front and back for any open wounds, evisceration, abrasions or bruises. Cover any protruding organs with saline dressings.
 15. Feel the abdomen for tenderness and rigidity.
 16. Estimate the initial circumference of the abdomen.
 17. Obtain and record vital signs frequently.
 18. Rechecks, every 5 – 10 minutes, for tenderness, rigidity and circumference are important. Hypotension, increasing circumference and abdominal rigidity are signs of intra-abdominal bleeding.
 19. Record all findings.
 20. Keep patient warm.
 21. Initiate transport to a higher level medical facility. Rescuers should begin transport no more than 10 minutes after their arrival on the scene unless extenuating circumstances exist.
 22. Continue ongoing evaluation and stabilization of abdominal injuries en route to hospital.
 23. Perform focused history and detailed physical examination en route to the hospital if patient status and management of resources permit.
 24. Contact medical direction for additional instructions.

ALS:

In addition to the above instructions, providers trained beyond BLS may initiate the following treatments.

1. Perform endotracheal intubation if the airway cannot be maintained by positioning or if prolonged assisted ventilation is anticipated. An assistant must maintain in-line cervical stabilization (if indicated) throughout the procedure. Use pharmacological adjuncts, such as lidocaine, sedatives, and paralytic agents, to aid in intubation as permitted by medical direction.
2. If intubation is made difficult by factors, such as clenched teeth, combativeness, etc., perform a rapid sequence intubation, using a paralytic such as vecuromium or succinylcholine, if properly trained and authorized by medical direction.
3. If a tension pneumothorax is suspected by mechanism of injury and as evidenced by severe respiratory distress, and/or absent breath sounds, perform needle decompression with a large bore needle at the second intercostal space over the third rib at the midclavicular line.
4. Initiate cardiac monitoring. Treat cardiac arrhythmias as dictated by your standing orders.
5. Obtain intravenous access using a large bore needle and balanced salt solution, e.g., normal saline or lactated ringers. If the patient shows signs of shock, initiate intravenous access in two sites using large bore needles. Do not delay transport to obtain intravenous access, this can be done en route.
6. Relative contraindications to morphine include a patient with hypotension, altered level of consciousness, head injuries, or respiratory depression. Use as dictated by your standing orders otherwise.

Additional Pediatric Considerations:

1. Children experience different types of injuries and have different physiologic reactions to injury as compared to adults. Patient outcome depends on the time it takes to get the patient to the hospital. Therefore, assessment and treatment are frequently done at the same time and scene time should be minimized to less than 10 minutes, if possible. Children may look fine initially, and then suddenly decompensate.
2. If tension pneumothorax is suspected, perform needle decompression with an 18 or 20 gauge over the needle catheter at the second intercostal space over the third rib at the midclavicular line.
3. When obtaining intravenous access, use an age appropriate large-bore catheter with large-caliber tubing and administer normal saline or lactated ringers at a sufficient rate to keep the vein open. If the patient shows signs of shock, initiate intravenous access in two sites.

4. If signs of decompensated shock are present, such as: decreased level of consciousness, poor color, capillary refill greater than 2 seconds, decreased blood pressure; administer a normal saline or lactated ringers fluid bolus at 20 cc/kg set to maximum flow rate. Reassess patient. Two additional fluid boluses at 20 cc/kg may be given if the patient remains in decompensated shock.
5. If signs of decompensated shock are present in a child less than 6 years of age and intravenous access cannot be obtained, obtain intraosseous access. Administer a normal saline or lactated ringers fluid bolus at 20 cc/kg and reassess the patient. Two additional fluid boluses at 20 cc/kg may be given if the patient remains in decompensated shock.

EXTREMITY TRAUMA

In the severely injured patient, injuries to extremities take a relatively low priority of management. Almost all extremity hemorrhage can be controlled by direct pressure or pressure dressings. Very rarely will a tourniquet be required. As with all trauma patients, complete therapy for extremity injuries takes place in the hospital. Delays at any level can be harmful to the patient. Evaluation of extremity trauma is part of the detailed assessment and should be performed only after the patient's ABCs have been evaluated and supported. Consider femur or pelvic fractures any time the degree of shock seems greater than indicated by the amount of external bleeding, or any time the mechanism of injury suggests the possibility of a femur fracture.

BLS:

1. Ensure scene safety. First priority should be given to the safety of the rescuers and then to altering the scene to make it a safe working environment or, if necessary, to moving the patient from the scene.
2. Perform a scene survey to assess environmental conditions and mechanism of injury.
3. Take body substance isolation precautions.
4. Establish patient responsiveness. Manually stabilize the spine.
5. Open the airway using head tilt/chin lift if no spinal trauma is suspected, or modified jaw thrust if spinal trauma is suspected.
6. Establish and maintain a patent airway while protecting the cervical spine. Suction as necessary. Insert an oropharyngeal or nasopharyngeal airway adjunct if the airway cannot be maintained with positioning. (Note that the nasopharyngeal airway is contraindicated in the presence of facial trauma.)
7. Initiate pulse oximetry, if available.
8. If breathing is inadequate, assist ventilation using a bag-valve-mask device with high flow, 100% concentration oxygen. Monitor for abdominal distention.
9. If breathing is adequate, administer high flow, 100% concentration oxygen using a non-rebreather mask or blow-by as tolerated.
10. Assess circulation and perfusion:
 - a. Check for the presence of a pulse. If patient has no pulse, begin CPR.
 - b. Check rate and quality of pulse.
 - c. Inspect for obvious bleeding.
 - d. Check blood pressure.
 - e. Observe skin color and temperature, and in children - capillary refill time.

11. Control hemorrhage with direct pressure or a pressure dressing, or elevation and pressure points.
12. Assess mental status.
13. Look for obvious deformities, abrasions, bruises, bleeding sites, amputated parts and protruding bones.
14. Feel for fractures, crepitus, and dislocations.
15. Check sensation distal to deformities with light touch and sharp sensation.
16. Check pulses distal to deformities.
17. Check movement distal to deformities.
18. Splint all possible fractures by immobilizing the fracture site, as well as the joint above and below the fracture.
19. Splint all open fractures without attempting to replace protruding bones into wounds.
20. Immobilize all injured joints in the position found, unless no pulse is palpable distal to the joint.
21. Straighten any grossly angulated extremity or joint if there is no palpable pulse distal to the angulation. By applying traction, align the extremity or joint in its normal anatomical position.
22. Splint all suspected femur fractures, using traction splinting devices as indicated.
23. PASGs may be used to splint lower extremity fractures.
24. Amputated parts should be wrapped in sterile gauze moistened with normal saline, protected from contamination (e.g., placed in a sterile rubber glove or ziplock bag) and put in ice water.¹
25. Record all findings.
26. Keep patient warm.
27. Initiate transport to a higher level medical facility. Rescuers should begin transport no more than 10 minutes after their arrival on the scene unless extenuating circumstances exist.
28. Perform focused history and detailed physical examination en route to the hospital if patient status and management of resources permit.

¹ An increasing number of communities in Alaska are developing replantation capabilities. Emergency medical service agencies should consult with local and regional replantation specialists to optimize protocols and standing orders.

29. Reassess patient every 5 – 10 minutes throughout transport.
30. Contact medical direction for additional instructions.

ALS:

In addition to the above instructions, providers trained beyond BLS may initiate the following treatments.

1. Perform endotracheal intubation if the airway cannot be maintained by positioning or if prolonged assisted ventilation is anticipated. An assistant must maintain in-line cervical stabilization (if indicated) throughout the procedure. Use pharmacological adjuncts, such as lidocaine, sedatives, and paralytic agents, to aid in intubation as permitted by medical direction.
2. If intubation is made difficult by factors, such as clenched teeth, combativeness, etc., perform a rapid sequence intubation, using a paralytic such as vecuromium or succinylcholine, if properly trained and authorized by medical direction.
3. Initiate cardiac monitoring. Treat cardiac arrhythmias as dictated by your standing orders.
4. Obtain intravenous access using a large bore needle and balanced salt solution, e.g., normal saline or lactated ringers. If the patient shows signs of shock, initiate intravenous access in two sites using large bore needles. Do not delay transport to obtain intravenous access, this can be done en route.
5. Relative contraindications to morphine include a patient with hypotension, altered level of consciousness, head injuries, or respiratory depression. Use as dictated by your standing orders otherwise.

Additional Pediatric Considerations:

1. Children experience different types of injuries and have different physiologic reactions to injury as compared to adults. Extremity injuries are common in children. Some of these injuries may be life or limb threatening. Patient outcome depends on the time it takes to get the patient to the hospital. Therefore, assessment and treatment are frequently done at the same time and scene time should be minimized to less than 10 minutes, if possible.
2. PASG can be used in children over 40 lbs. if local protocol dictates. Do not inflate the abdominal section in children less than 10 years of age. (Do not rely on blood pressure as a sign of shock in children; it is a very late finding.)
3. When obtaining intravenous access, use an age appropriate large-bore catheter with large-caliber tubing and administer normal saline or lactated ringers at a sufficient rate to keep the vein open. If the patient shows signs of shock, initiate intravenous access in two sites.

4. If signs of decompensated shock are present, such as: decreased level of consciousness, poor color, capillary refill greater than 2 seconds, decreased blood pressure; administer a normal saline or lactated ringers fluid bolus at 20 cc/kg set to maximum flow rate. Reassess patient. Two additional fluid boluses at 20 cc/kg may be given if the patient remains in decompensated shock.
5. If signs of decompensated shock are present in a child less than 6 years of age and intravenous access cannot be obtained, obtain intraosseous access. Administer a normal saline or lactated ringers fluid bolus at 20 cc/kg and reassess the patient. Two additional fluid boluses at 20 cc/kg may be given if the patient remains in decompensated shock..

BURNS

Effective management of burn patients requires that resuscitation measures be started as soon as possible after injury and that those providing care have an understanding of basic burn care. The goal is to transfer the patient to a facility capable of providing the necessary level of care for that individual. Because of long transport times and weather delays, individuals providing initial care must be familiar with the care of a major burn injury for the first 24 – 48 hours. This is all undertaken with the understanding that contact will be made with the burn center to arrange transportation and review specific care required for the patient.

Burns that require specialized care in a recognized burn center or unit include:

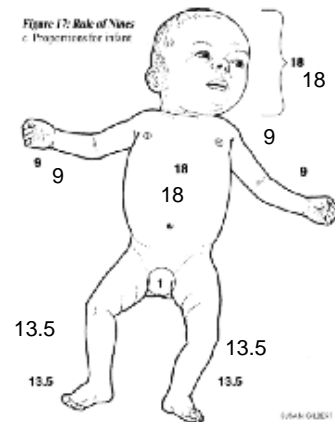
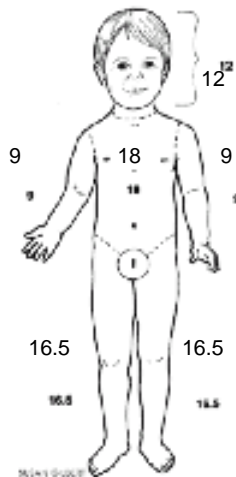
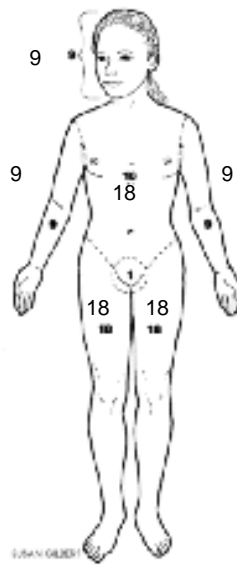
- *Second and third degree burns of greater than 10% TBSA (total body surface area) in patients <10 years of age or >50 years of age.*
- *Second and third degree burns of greater than 20% TBSA in all other patients.*
- *Third degree burns totaling 5% TBSA or more in any age group*
- *Second and third degree burns with serious threat of functional or cosmetic impairment involving the face, neck, eyes, ears, hands, feet, major joints, genitalia, and the perineum.*
- *Electrical burns.*
- *Chemical burns.*
- *All burns associated with inhalation injury.*
- *Circumferential burns of the chest or extremities.*
- *Burns associated with concomitant major trauma.*
- *Burn injury occurring in patients with pre-existing medical disorders or in the very young or very old.*

BLS:

1. Ensure scene safety.
2. Perform a scene survey to assess environmental conditions and mechanism of injury. If hazardous materials are involved, contact an appropriate agency before approaching the patient. Take care to protect yourself from contact with corrosive material or electric current.
3. Take body substance isolation precautions.
4. Stop the burning process. Remove all clothing and jewelry in affected area. If a dry chemical is involved, brush it off, then flush with copious amounts of water. If a caustic liquid is involved, flush with copious amounts of water. Be aware of the possibility of causing hypothermia and be prepared to treat this condition.
5. Establish patient responsiveness. If cervical spine trauma is suspected, manually stabilize the spine.
6. Open and assess the patient's airway. Use positioning or adjuncts as necessary to maintain patency. Suction as needed. Is there any foreign material, carbonaceous material, vomitus, etc.

7. Assess breathing. Initiate pulse oximetry, if available.
8. If breathing is inadequate, assist ventilation using a bag-valve-mask device with high flow, 100% concentration oxygen. If abdominal distention arises, consider placing a nasogastric tube to release air from the stomach.
9. Administer high flow, 100% concentration oxygen by non-rebreather mask for potential inhalation injury or any serious thermal burn.
10. Assess circulation and perfusion.
 - a. Check for the presence of a pulse. If patient has no pulse, begin CPR.
 - b. Check rate and quality of pulse.
 - c. Inspect for obvious bleeding.
 - d. Check blood pressure.
 - e. Observe skin color and temperature, and in children - capillary refill time.
 - f. Check for circumferential burns of extremities.
11. Assess mental status.
12. Expose the patient as necessary to perform further assessments while maintaining the patient's temperature.
13. For chemical burns, if there is eye involvement, immediately begin flushing the eye with normal saline. Continue flushing throughout assessment and transport.
14. Apply a burn sheet or dry sterile dressings to burn areas. To prevent hypothermia, avoid moist or cool dressings and do not leave wounds or skin exposed.
15. If spinal trauma is suspected, place a rigid cervical collar and immobilize the patient as appropriate.

16. Estimate the TBSA by the “Rule of Nines.” See charts.



Adult Body Part	% - Total Body Surface
Arm (shoulder to fingertips)	9%
Head and neck	9%
Anterior Trunk	18%
Posterior Trunk	18%
Leg (groin to toe)	18%

Child Body Part	% - Total Body Surface
Arm (shoulder to fingertips)	9%
Head and neck	12%
Anterior Trunk	18%
Posterior Trunk	18%
Leg (groin to toe)	16.5%

Infant Body Part	% - Total Body Surface
Arm (shoulder to fingertips)	9%
Head and neck	18%
Anterior Trunk	18%
Posterior Trunk	18%
Leg (groin to toe)	13.5%

17. Initiate transport to a higher level medical facility. Rescuers should begin transport no more than 10 minutes after their arrival on the scene unless extenuating circumstances exist.
18. Contact medical direction for additional instructions.
19. Record all findings.
20. Reassess the patient frequently.

ALS:

In addition to the above instructions, providers trained beyond BLS may initiate the following treatments.

1. Perform endotracheal intubation if the airway cannot be maintained by positioning or if inhalation injury is suspected. Use pharmacological adjuncts to aid in intubation as permitted by medical direction.
2. If the injury involves an electrical burn, initiate cardiac monitoring. Treat cardiac arrhythmias as directed by your standing orders.
3. Start two large bore IV catheters. May insert through burn area, if necessary.
4. Fluid administration:
 - First 24 hours: 4ml lactated ringers (LR)/Kg/%TBSA.
 - Half of this amount is to be given in the first 8 hours after injury.
 - The remaining half is to be given over the next 16 hours.
 - Example: A 70 Kg man who had sustained a 50% TBSA would require a total of 14,000ml in the first 24 hours, 7,000ml would be given in the first 8 hours. If the patient is not seen until 4 hours after the time of burn, that amount should be given over the next 4 hours.
 - Second 24 hours: give normal maintenance fluids in sufficient volume to maintain a normal urinary output. Albumin, if available, may be given under direction of the Burn Center physician.
5. Insert a foley catheter. Urine output is to be maintained in the range of 30 –50 ml/hour in adults and at 1 ml/Kg body weight up to 30 Kg body weight in children.
6. Electrical burn fluid management:
 - In electrical burns where there is a large amount of pigment (hemoglobin or myoglobin) in the urine, the urinary output should be maintained between 75 – 100 ml/hour until the urine is grossly clear, then fluids may be cut back to maintain the output in the 30 –50 ml/hour range.
 - In addition, 44 – 50mEq of NaHCO₃ per liter of LR is administered to keep the urine alkaline as long as visible pigment is present.
 - If urinary output does not respond to increased fluid administration, then, and only then, give 12.5 gm mannitol IV.

7. Insert nasogastric tube if burns are 20% TBSA or more.
8. Pain relief: Morphine should be given in repeated small doses IV to titrate effective pain control, monitoring for respiratory depression.
9. Give all medications intravenously (except Tetanus toxoid and Tetanus Immune Globulin which should be given S.C. and IM, respectively).

Additional Pediatric Considerations:

1. Children under 5 years of age with burns represent the age group most often found with burns resulting from child abuse. Look for characteristic burns that should make you suspect they are the result of child abuse. The child with burns to the back, buttocks, and posterior neck should alert your suspicion of abuse.
2. Circumferential scald burns of hands or feet that are clearly demarcated and uniform with no splash marks are also characteristic of child abuse.
3. When administering IV fluids to children, you may consider using 5% glucose in lactated ringers to maintain adequate blood sugar. If possible, periodically check blood glucose levels in children.
4. When measuring TBSA in children, an alternate method is to use the child's palm, or clenched fist, which equals 1% of the body surface area. This serves as a quick method. But be sure to use the child's palm or fist and not your own.

Pneumatic Anti Shock Garment (P.A.S.G) Guidelines

Note: The American College of Surgeons states in their Advanced Trauma Life Support Guidelines that the efficacy of pneumatic anti-shock garment in the rural setting remains unproven and, in the urban prehospital setting, controversial. These protocols specify 90 mmHg as a target for the patient's systolic blood pressure. Currently, there is a great deal of research concerning the optimum systolic blood pressure to be achieved and maintained during trauma resuscitation efforts and readers are advised to consult their local physician medical director when developing or revising standing orders and protocols.

1. **Initial Assessment**
 - a. Maintain adequate ABC's
 - b. Control external hemorrhage

2. **Detailed Examination/Rapid Trauma Assessment**
 - a. Assess all injuries
 - b. Obtain vital signs and assess chest sounds bilaterally.
 - c. Record vital signs and pertinent information as patient care permits

3. **Airway Protocol**

4. **PASG Indications**
 - a. Pelvic or multiple leg fractures exist. If patient is normotensive, inflate only until fractures are immobilized
 - b. Signs of shock are present (rapid, weak pulse, pale, clammy skin, altered level of consciousness, low blood pressure, etc.)

5. **Application and Inflation Procedures**
 - a. Before application, remove shoes, belt, and pants if time and patient care permits. If you are not able to remove the patient's clothing, empty the patient's pockets.
 - b. Inflate leg sections until easily dented with finger or until systolic blood pressure is 90 mmHg
 - c. Recheck blood pressure
 - d. If systolic blood pressure is less than 90 mmHg, inflate the abdominal section until easily dented with finger or systolic blood pressure in 90 mmHg.
 - e. Recheck blood pressure
 - f. If further pressure is needed, inflate the legs and then the abdominal section until one of the following occurs:
 - i. patient's blood pressure is 90 mmHg
 - ii. pop off valves release
 - iii. velcro fasteners begin to slip

6. Special Points

- a. The PASG should be inflated on the basis of the patient's blood pressure and not the pressure within the suit
- b. DO NOT DEFLATE the PASG in the field except in the patient in cardiogenic shock who develops pulmonary edema and/or worsening vital signs. In this case, seek advice from ALS base/hospital ER.
- c. Be alert for pressure changes caused by altitude and temperature variations.

7. Contraindications

- a. Pulmonary edema
- b. DO NOT inflate abdominal section if the patients is obviously pregnant, has protruding bowels or an impaled object in the abdominal area.
- c. Known diaphragmatic rupture
- d. Uncontrolled hemorrhage outside the confines of the garment, e.g. thorax, upper extremity, scalp, face or neck.

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